SITE OE-6

MINE AND BOOBY TRAP TRAINING AREA

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3.6 Site OE-6 (Mine and Booby Trap Training Area)

This summary report consists of two parts. The first part, contained in Sections 3.6.1 through 3.6.5, includes a presentation and assessment of archival data. Specific elements include a review of site history and development, evaluation of potential ordnance at the site, a summary of previous ordnance and explosives (OE) investigations, and a conceptual site model. The above-mentioned information was used to support the second part of this report, which is the Site Evaluation (Section 3.6.6). The Site Evaluation was conducted in accordance with the procedures described in the *Final Plan for Evaluation of Previous Work* (*Harding Lawson Associates [HLA], 2000b*) and may restate some information presented previously. The Site Evaluation discusses the evaluation of the literature review process (Section 3.6.6.1) and evaluation of sampling process(es) (Section 3.6.6.2). These discussions are based upon information from standardized literature review and sampling review checklists (Attachment 6-A1). Section 3.6.7 provides conclusions and recommendations for the site. References are provided in Section 3.6.8.

3.6.1 Site Description

Site OE-6 (Mine and Booby Trap Training Area) is a 2-acre area located in the northwest portion of the former Fort Ord, west of the town of Marina (Plate 6-1; *U.S. Army Engineer Division, Huntsville [USAEDH], 1993*). The location and boundary of Site OE-6 were identified through a review of Fort Ord historic records completed for the Fort Ord Archive Search Report (ASR; *USAEDH, 1993*).

3.6.2 Site History and Development

The following presents a summary of the site history and development that is based on archival research and review of historical training maps and aerial photographs. Plates have been prepared that present pertinent features digitized from historical training maps and scanned aerial photographs reviewed by Harding ESE. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time has also resulted in misalignments of some map features with respect to the aerial photographs.

1940s Era

The site lies within a land tract purchased from private landowners by the U.S. Army (Army) in late 1940 (*Arthur D. Little, Inc. [ADL], 1994*). Review of 1940s documentation and aerial photographs indicates evidence of training south of the ASR site boundary. Construction of the Main Garrison to the south of Site OE-6 and the installation of water supply wells to the east began during the early 1940s. More specific information is provided below:

- Evidence of a disturbed area south of the ASR site boundary is visible on aerial photos from 1941 and 1949 (Plate 6-2). The site appears as if it had been cleared of vegetation based on the presence of straight-line contacts between vegetation and what appears to be dune sand. The fact that the area was cleared indicates that it may have been used by the Army, possibly for troop training. Vegetation patterns appear similar, but less dense, in the 1949 aerial photograph.

- The site is within a larger area identified on 1945 and 1946 Fort Ord maps as a "Well Area, No Artillery Firing or Demolitions". This area incorporates the majority of the Main Garrison. The 1945 Training Facilities map identifies a "Camouflage Area" in the site area (Plate 6-3; *Army, 1945 and 1946b*).

- The 1946, Main Garrison Cantonment Land Use Map (*Army, 1946a*) identifies a "Camouflage Training Area" just south of Site OE-6.

1950s Era

Review of 1950s era documentation including training maps, aerial photographs, and other Fort Ord maps indicates that mine and booby trap training occurred between 1946 and 1954. The following summarizes the results of the 1950s historical map and aerial photograph review:

- An area labeled "Mines & Booby Traps" (Plate 6-3) was identified on the circa 1954 map. A boundary for this area is delineated on this map (*Army, 1954*).

- The 1954 training map also shows that there were three former practice mortar squares approximately 1,000 feet south of the ASR site boundary (Plate 6-3). These are shown as cleared areas on the 1956 aerial photograph.

- The Mines and Booby Trap Training Area is not noted on training maps after 1954. There are no training areas within the footprint of OE-6 (based on ASR boundaries) on training maps after 1954.

- The 1956 aerial photograph shows a long stretch of disturbed/cleared area just south of Site OE-6. As previously discussed, the absence of vegetation suggests that the area may have been cleared for troop training.

- The 1957 and 1958 Training Area and Facilities maps identify a "Flame Thrower Range" just south of Site OE-6 (*Army, 1957 and 1958*).

1960s to Present

Housing was constructed south and southeast of Site OE-6 in 1962 (Plate 6-4). This area is currently designated as Patton Park. No training areas are identified in this area on 1960s training maps or any maps thereafter. More specific information is provided below:

- The 1964 training map shows the "Marina Housing Area" just southeast of Site OE-6. Other records indicate that the development was known as Patton Park housing (*ATC/Diagnostic Environmental/Inc. [ATC], 1994*). There are no training areas shown at the site location on this map or any other training or historical maps thereafter (*Army, 1964*).

- The 1966 and 1975 aerial photographs show that the area is vegetated with dirt roads transecting the areas within and adjacent to Site OE-6. There is residential housing to the east and south.

- A 1999 aerial photograph shows that the area is vegetated, and generally undeveloped, with the exception of a dirt road that runs roughly north-south along the western site boundary. There is residential housing to the southeast and south (Plate 6-4).

- No recorded discoveries of ordnance within the Site OE-6 footprint or adjacent areas have been identified in the 30 years that the nearby housing was occupied.

Proposed Future Land Use

Future reuse of this area includes mixed use of open space and housing in the adjacent area to the south and east.

3.6.3 Potential Ordnance Based on Historical Use of the Area

This section identifies the types of ordnance that may have been used in this area. Historical records indicate that the site vicinity was used for mines and booby trap training. General descriptions of mines, booby traps, and booby trap simulators are provided below. A detailed description of mines and booby traps that were potentially used at the site is provided in Attachment 6-A2.

3.6.3.1 Mines

It is expected that only practice, inert, training, and dummy mines were used in this area as part of training activities based on the proximity of the site to Highway 1, the city of Marina, and barracks. Inert practice mines were found and removed from Site OE-6 and the area to the south, which is consistent with the assumption that practice mines were used for training at the site. Information concerning mines and booby traps that were potentially used for training was obtained from technical manuals (*Army, 1977a, b*) and *The American Arsenal* (*Hogg, 2001*). The following practice mines and fuzes have been found during sampling at the site and the area to the south:

- M1 Antitank practice mine
- M10 Antitank practice light mine
- M8 Antipersonnel practice mine
- M604 fuze.

Descriptions of these mines are provided in Attachment 6-A2. As discussed in Attachment 6-A2, these items were produced prior to or during the time that the site was used for training (1950s). Therefore, they could be present at the site as a result of past training practices.

3.6.3.2 Booby Traps and Booby Trap Simulators

Booby traps and booby trap simulators may have been used at the site. Booby traps are actuated when an object is moved and triggers a firing device. Most booby traps use trip wires, which release cocked striker-type firing devices. Booby traps are actuated when a trip wire is pulled or plate or rod are pressed by someone or something moving through the booby-trapped area. Many triggering devices are used in booby traps. They include fuzes, igniters, and firing devices. Standard firing devices have a standard base coupling by which they may be readily attached to a variety of charges. Explosives, blasting caps, with detonating cords are not used with firing devices in booby trap training areas because of the risk of injury. Charges and blasting caps are only used in demolition areas (*Hall, 2003b*); and therefore, are not expected to have been used at OE-6. In training, firing devices could be attached to practice mines or simulated explosive devices to provide realistic training in setting and disarming booby traps (*Hall, 2003a*).

Booby trap simulators may also have been used in training. Explosive booby trap simulators are used during maneuvers and during training exercises to teach the installation, detection, and use of booby traps.

Booby trap simulators contain pyrotechnic charges. The charges produce (1) an instantaneous explosion, flash and, sound on initiation, or (2) illumination flame, or (3) whistle.

Based on review of a 1959 Fort Ord yearbook, booby trapping of mines appears to have been taught at Fort Ord. However, there is no specific information about what booby trap firing devices or simulators were used for training at Fort Ord in 1950s. Firing devices that may have been used as part of booby trap training in the 1950s at Fort Ord include the M5 Pressure Release Firing Device, M1A1 Pressure Firing Device, the M1 Pull Firing Device, the M3 Pull/Release Firing Device, and the M1 Pressure Release Firing Device (See FM 5-31 Boobytraps; September 31, 1965.) These firing devices contain no energetic materials (e.g., pyrotechnic charges), unless the coupling base is attached. As stated above, in training, firing devices are likely to be connected to practice mines or coupling bases. Descriptions of these firing devices are provided in Attachment 6-A2.

3.6.4 History of Ordnance and Explosive Investigations

The following presents a summary of OE-related reports and investigations concerning the site.

1993 Archives Search Report

The purpose of the Archives Search was to identify sites, gather and review historical information to determine the types of munitions used at Fort Ord, identify possible disposal areas, identify unknown training areas and recommend follow-up actions. Guidance for conducting archives searches did not exist prior to 1995. The ASR was completed based on the Scope of Work provided to the St. Louis Corps of Engineers by the Huntsville Corps of Engineers and on archive search reports completed at other military installations. The Archives Search included a Preliminary Assessment/Site Investigation (PA/SI) consisting of interviews with individuals familiar with the sites, visits to previously established sites, reconnaissance of newly identified training areas, and the review of data collected during sampling or removal actions. Requirements for preparation of an ASR are described in Section 2.0 of this report.

Site OE-6 was identified in the 1993 ASR as a mine and booby trap training area (*USAEDH, 1993*) on the basis of maps from circa 1954. The estimated size was 2 acres and the site was identified as being in the vicinity of FR 067595. As shown on Plate 6-2, this area is north of the digitized boundary of the area shown on the circa 1954 map as the Mines and Booby Trap Area. The method for determining the site boundary was not discussed in the ASR. It should be noted that the original site boundary was identified based on less information and fewer tools (e.g., no geo-referenced aerial photographs, no GIS maps, or database) than are currently available. The recommendation in the ASR was to perform magnetometer sweeps in the area.

1994 Human Factors Applications, Inc. (HFA)

An initial investigation of Site OE-6 was completed in January and February 1994 by HFA (*HFA, 1994*). The scope of work for HFA indicated that the site was approximately 2 acres, located adjacent to Patton Elementary School and the State Highway. The scope of work referred to the ASR, so it is assumed that the coordinates listed in the ASR were those used to establish the site boundary and locate the sampling grids. Contract requirements for the scope of work performed by HFA are described in more detail in Section 2.0 of this report.

HFA sampling methodology is discussed in detail in Section 3.1.6.2 and is summarized below. As discussed in Section 3.1.6.2, eight 100- by 100-foot grids were sampled (100 percent of the identified anomalies were investigated) along a maximum 5-foot wide search lane using either the Schonstedt Model GA-52/C or the Schonstedt Model GA-72/Cv magnetometer. These grids (D2J4H7-01, D2J4G7-

01, D2J4F6-02, D2J4F7-02, D2J4F8-01, D2J4F6-01, D2J4F7-01, and D2J4E7-01) are shown as blue squares on Plate 6-4. These grid locations are based on the grid location map presented in *HFA, 1994*. One live small arms 7.62mm cartridge and one inert M1 practice antitank mine were found and removed during HFA grid sampling.

The scope of work for HFA indicated that detailed accounting of all "OEW items/components/scrap" encountered would be performed. However, grid records providing this information are no longer available. The only information regarding items found is summarized in the text of the HFA final report (*HFA, 1994*). The report itemized inert or expended OE-items found. Some non-OE scrap was removed and turned in at the end of the project.

At the request of the Corps of Engineers, Huntsville Division (CEHND) Safety Specialist, on March 16, 1994, HFA established eight sample grids south of Site OE-6 and were designated 1-5 through 1-12 in the HFA report (*HFA, 1994*). Because the area was located near the Patton Elementary School, it was designated by HFA as the Monterey Peninsula Unified School District (MPUSD) Area. These are identified as Grids D2J4B4-01, D215J4-01, D214H4-01, D214G0-01, D215G4-01, D215D4-01, D214F8-01, and D214A8-01 and are shown as pink squares on Plate 6-4. Three of these grids and portions of three other grids fall within the boundary of the Mines and Booby Trap Area shown on historical training maps. It is assumed that the sample grids were 100 by 100 feet, as specified by the work plan (*HFA, 1993*). During the sampling program, four inert practice antitank mines and one inert practice antipersonnel mine, were found and removed (*HFA, 1994*). The locations and depths at which these items were found were not documented. Because the exact locations of these OE scrap items are not known, the locations of the found items are not illustrated on Plate 6-4, which shows grid locations. According to Mr. Clinton Huckins (USACE Unexploded Ordnance [UXO] Safety Specialist), these items were inert training aids (*Huckins, 2002*). A summary of sampling operations conducted at Site OE-6 and the MPUSD Area is provided in Table 6-1. Table 6-2 provides a summary of OE scrap found during sampling operations.

1997 CMS Environmental Inc., (CMS) Land Re-Survey

In April 1997, CMS resurveyed the site boundary and HFA sampling grids using global positioning system (GPS) technology. Contract requirements for the scope of work performed by CMS are described in Section 2.0 of this report. There is no documentation explaining the reason for the CMS re-survey other than a reference in the EE/CA indicating that available geographic data were not sufficient to ensure that site sampling had occurred within the site boundaries. The HFA grids and site boundary were resurveyed based on the locations of stakes found in the field by CMS personnel; only four of the sixteen HFA grids (including MPUSD grids) were resurveyed. No additional magnetometer sweeps or samplings were performed by CMS. These grids are identified as yellow squares on Plate 6-4. As shown on Plate 6-4, the grid areas surveyed by CMS were within the site boundary. The re-surveyed grids were located northwest of the grids shown on the plate in the HFA report. The reason for the discrepancy could be because of lack of accuracy in HFA documentation and surveying and/or the level of accuracy in registering and digitizing features from paper copies of maps.

1997 Engineering Evaluation/Cost Analysis – Phase I

On the basis of the Site OE-6 sampling results, no further action for Site OE-6 was recommended in the Final Phase I Engineering Evaluation/Cost Analysis (EE/CA; *U.S. Army Corps of Engineers [USACE], 1997*).

1997 Archives Search Report

This report updates information contained in the 1993 ASR and includes the HFA sampling results and Final Phase I EE/CA recommendations. No further action was also recommended in the 1997 ASR.

2004 Site Walk

A site walk was conducted at Site OE-6 on June 2 and 3, 2004. The site walk was conducted at the request of the USEPA to fill gaps in sampling efforts conducted previously at this site. To investigate this former mine and booby-trap training area, the team utilized a meandering path method for the site walk. The site walk was conducted by a three-person team that included a UXO Safety Specialist. The team swept the path walked using a Schonstedt Model GA-52/Cx magnetometer. The path was also recorded using a real-time kinematic (RTK) GPS unit. The position of any anomaly detected by the Schonstedt GA-52/Cx was recorded with the GPS. Only OE scrap items (two expended fuzes for M1 series practice mines, an expended firing device [M1]), and live and expended small arms ammunition were found during the site walk. A description of the site walk is included as an attachment to Appendix C of this report.

3.6.5 Conceptual Site Model

Conceptual site models (CSMs) are generally developed during the preliminary site characterization phase of work to provide a basis for the sampling design and identification of potential release (functioning of the OE item; e.g., detonation) and exposure routes. CSMs usually incorporate information regarding the physical features and limits of the area of concern (the site), nature and source of the contamination (in this case OE), and exposure routes (potential scenarios that may result in contact with OE).

The CSM for Site OE-6 is based on currently available site-specific and general information including the Phase I EE/CA (*USACE, 1997*), ASR (*USAEDH, 1993*), Draft Final Literature Review Report (*HLA, 2000a*), review of aerial photographs, training maps, sampling results, field observations, and technical manuals. The CSM was developed to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways. Plate 6-5 presents a conceptual site model.

3.6.5.1 Training Practices

Training practices are discussed below to provide information on the potential types and distribution of OE that may have been used at the site, and the potential areas of concern remaining at the site, if any.

Mine Training

There is no available information about how specific training was performed in this area in the 1950s. According to current field manuals, practice and inert mines or explosive booby trap simulators are used in training personnel in the precautions and proper methods to be observed in the care and handling, arming, booby trapping, and disarming mines (*Army, 1997*). High explosive mines are not normally used in training, except for demonstration purposes. The 1997 training manuals indicate that live mines are used as part of current training practices, but that live mine training and simulator training will not take place concurrently at the same location in order to preclude a live mine being mistaken for an inert mine *(Army, 1997*). Because of the proximity of Site OE-6 to Highway 1, the City of Marina, and barracks, it is unlikely that high explosive mines were used at this site.

Information concerning emplacement of minefields in Army training manuals serves as a guide as to how the site vicinity may have been used for mine and booby trap training (FM20-32, Chapter 13 and DA PAM 350-38; *Army, 1997*). Current training in mine warfare tasks includes installation and removal of antipersonnel and antitank mines and anti-handling devices. Training also includes installation, recovery, or transfer of a hasty protective minefield as well as emplacement of tactical minefields, and row, standard pattern, and scatterable minefields. Training also includes breach of minefields (including use of explosives) as well as mine awareness training.

Based on practices described in field manuals, it is likely that during training, the trainees would learn to mark mine locations as well as practice mine removal operations. It is also likely that the trainees would practice clearing a path or lane through the minefield by probing, marking, and possibly destroying the mines with explosives or grappling hooks. Based on the proximity of Site OE-6 to Highway 1, the City of Marina, and barracks, it is unlikely that the mines would have been destroyed with explosives during training.

Booby Trap Training

No Fort Ord-specific information is available for booby trap training in the 1950s. Information presented below is based on current training manuals (*Army, 1997*) and from personal communication (*Hall, 2003a*).

Booby traps are placed in a variety of locations, some of which can include:

- In and around buildings, installations, and field defenses.
- In and around road craters or any obstacle that must be cleared.
- In natural, covered, resting places along routes.
- In likely assembly areas.
- In the vicinity of stocks of fuels, supplies, or materials.
- At focal points and bottle necks in road or rail systems.

When setting booby traps, the commander establishes a control point that serves as a headquarters and material holding area. Each setting party works in a clearly defined area. Entry to these areas is strictly controlled. The locations of booby traps are recorded. The traps are inspected for safety and camouflage before they are armed.

Based on these general field practices, it would be expected that as well as setting the traps, personnel would also practice neutralizing and removing the traps.

If the training was in setting or disarming the traps, it is very likely that actual booby trap firing devices were used with a standard coupling base (sometimes referred to as a base coupling) used to provide an energetic report to indicate that the trap had been successful. Only rarely would any reason exist to connect these firing devices to explosives, blasting caps, or detonating cord, and this would have to be done in a demolition area properly sited for the explosives quantities used (*Hall, 2003a*).

If the training was in detecting/avoiding booby traps, the booby trap simulators would provide a training environment similar to that provided by the actual firing devices and could thus be used in lieu of the actual firing devices (*Hall, 2003a*). The functioning of these items is discussed in Attachment 6-A2.

Camouflage Training

There is no specific information about what activities were involved in camouflage training at Fort Ord in the 1940s. However, general principals of camouflage described in a War Department Field Manual FM5-20 (*Army, 1944*) are to use concealment and deception to promote offensive action, to surprise, mislead the enemy, and prevent the enemy from inflicting damage. Concealment includes hiding from view, making it hard to see clearly, arranging obstructions to vision, deceiving and disguising. It is expected that as part of camouflage training, troops would practice concealment of equipment or personnel positions using natural materials (vegetation, earth, sand, or gravel) or using artificial materials including shrimp nets, twine nets, chicken wire netting, cloth garnishing, smooth soft steel or iron wire, steel and glass wool garnishing, rope, wood, and steel stakes and posts. It is unlikely that camouflage training would have employed the use of OE.

3.6.5.2 Site Features

The mines and booby traps could have been set up anywhere in the site vicinity and would likely be buried or camouflaged.

3.6.5.3 Potential Sources and Location of OE

Practice antipersonnel and anti-tank mines could still be present at the site. Some practice mines and/or their fuzes contain a pyrotechnic charge or a smoke producing increment. These mines would likely have been buried shallowly. To be conservative and for comparison to other studies, the depth of burial was assumed to be up to 1 foot bgs (below ground surface). The firing devices used for booby traps and booby trap simulators potentially used at the site may have been left or discarded on the ground surface and currently, may be covered by soil. Firing devices do not contain energetic materials unless the coupling base is attached (*Hall, 2003a*).

3.6.5.4 Potential Exposure Routes

Potential exposures to OE, although unlikely, could result from encountering unexpended practice mines and mine fuzes, coupling bases from firing devices, and booby trap simulators. It should be noted that the items found at Site OE-6 and vicinity during sampling and the site walk were all inert or expended.

For each of the OE items potentially remaining at the site, the following discussions provide information on: (1) how the item was designed to function, (2) the likelihood the item would function if found onsite and handled, and (3) the type of injury the item could cause if it functions. Additional detail on these items are presented in Attachment 6-A2.

Antipersonnel Practice Mines (M8, M8A1) and Fuzes (M10, M10A1). Mines, antipersonnel, practice, M8 and M8A1 were designed to simulate the M2 (bounding) series of antipersonnel mines. They were used for training in the proper methods and precautions to be observed in the care, handling, laying, booby-trapping, arming and disarming of the M2 and M15 series mines. The fuze firing mechanism is activated by applying pressure (8 to 20 pounds) on any of the three prongs on the M10 or M10A1 combination fuze, or a pull of 3 to 10 pounds of pressure on the trip wire. The fuze firing train ignites the delay element in the projectile, and also propels it about 2 meters into the air. The delay initiates the spotting charge, which explodes with a loud report and emits smoke. The M8A1 mine with the M10A2 fuze functions the same except that the fuze firing train ignites the yellow smoke pellets through a 4 to 5 second delay, expels a plastic plug into the air allowing the yellow smoke to be emitted from the top of the container (*Army, 1994a*). Assuming that a mine was left emplaced and armed, and that it survived many years of degradation from exposure, it could be functioned by incidental contact by applying

sufficient pressure to any of the prongs or trip wire on the M10, M10A1, or M10A2 combination fuze by stepping upon the fuze or tripping on the trip wire. If caused to function, the type of injury that could be sustained from the M8 mine would be burns from the 170-grain black powder spotting charge, and possible injury from falling parts. If caused to function, the M8A1 would propel a plastic plug into the air allowing yellow smoke to be emitted from the container. Because the spotting charge is black powder, it will function if it dries out after being exposed to moisture.

Summary: It is unlikely that a person would be able to trigger the practice antipersonnel mine through casual contact if one were found at the site and be burned or exposed to smoke or falling parts, because the mine: (1) would have to contain a live fuze, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Antitank Practice Mines (M12, M12A1, M20) and Fuzes (M604). The fuze, mine, antitank, practice (M604) is designed for use in the M12, M12A1, and the M20 antitank practice mines. The fuze is an instantaneous, mechanical, pressure-activated type fuze consisting of a steel body containing the firing pin assembly, cover assembly, primer and smoke charge, and a safety fork. The fuze is issued separately and assembled to the mine in the field. After it is fired and the mine is recovered a new fuze can be installed and the mine reused. A minimum force of 140 to 240 pounds depressed the pressure plate that caused the Belleville spring to snap into reverse, driving the firing pin into the primer. The primer ignites the smoke composition, which flashes emitting a cloud of smoke and creating a noise. The primer contains 1.62 grains of primary explosive and 2.96 grains of black powder, and the smoke composition weighs 262.3 grains or 0.6 ounces (*Army, 1994a*). The mine was designed to be triggered by the weight of a vehicle, and would require more weight than a large person can apply by just stepping on the pressure plate to trigger it. If caused to function, the type of injuries that could be sustained would be a burn injury from the 262.3 grains of smoke composition.

Summary: It is highly unlikely that a person would be able to trigger a fuze through casual contact if one were found at the site and sustain a burn injury, because the fuze: (1) was designed to be triggered by the weight of a vehicle, and (2) would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.

Antitank Practice Mines (M1, M1A1) and Fuzes (M1A1, M1A2). The mine, antitank, practice M1 and M1A1 was designated to simulate the M1 and M1A1 HE antitank mines. The M1 series mine may be used with the M1A1 or the M1A2 fuze. They were used for training in the proper methods and precautions to be observed in the care, handling, laying, boobytrapping, arming and disarming of the M1 and M1A1 antitank mines. The mine is functioned by applying pressure (200 to 500 pounds) to the pressure plate, which fires the Activator, Antitank Mine: Practice, M1 which contained a small detonator (2.34 grains) and 20 grains of smoke composition. The activator operates when the action of a firing device initiates the igniter charge, which in turn, ignites the smoke charge, releasing a puff of white smoke with accompanying noise (*Army 1994a; Navy, 1947*). The mine could be caused to function by incidental contact by applying sufficient force to the pressure plate of the mine. The mine, being antitank by type, requires more weight than a large person can apply by just stepping on the pressure plate. It would require a vehicle to generate the necessary pressure to activate the M1 activator.

Summary: It is highly unlikely that a person would be able to trigger a practice antitank mine through casual contact if one were found at the site and be exposed to smoke and noise, because the mine: (1) would have to contain a live fuze and active detonator, (2) was designed to be triggered by the weight of a vehicle, and (3) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Booby Trap Firing Devices. The firing devices shown in the table below are all issued with a coupling base firing device consisting of a metal or plastic body and an internal percussion primer (similar to the

primer in a small arms cartridge), and are designed to be used to set up booby-traps. They could also be used as a secondary firing device (booby-trap) for most anti-personnel and antitank mines. The firing devices could be set up to fire if a trip wire was pulled, pressure was released as in a weight being removed, or if a line under tension were cut. In each case, triggering the device would cause the spring-loaded firing pin to strike the percussion primer initiating the explosive train. As these items were used in training, no high explosives were used. The percussion primer provided sufficient noise to denote a detonation for training (*Army, 1994b*). It is unlikely that a set up booby trap, which includes one or more of the above firing devices, would remain in operational condition after many years of exposure. These devices are not sealed units. They are designed to be set up in the field quickly to provide temporary area denial or separation of forces. Many booby trap firing devices require trip wires to activate them, which are composed of a thin wire that will not survive long exposure to the elements. The firing devices themselves are not sealed to protect them from exposure to the environment. In the unlikely event that one of these armed devices were made to function, they would likely produce a shock, noise, and flash. They are not likely to cause injury by themselves.

Nomenclature	Type by function	Lbs. Required to function
Firing Device, M1	Pull	3 to 5
Firing Device, M1	Pressure Release	3
Firing Device, M1 and M1A1	Pressure	20
Firing Device, M1	Chemical Delay	6 to 1130 minute delay
Firing Device, M3	Pull or Release	6 to 10 of Pull & any release of tension
Firing Device M5	Pressure Release	Approx. 5
Coupling Base, Firing Device, M2	Non-metallic	NA
Coupling Base, Firing Device	Metallic	NA

Summary: It is unlikely that a person through casual contact could cause an armed booby trap firing device fitted with a coupling base to function if one were found at the site, and be exposed to the shock, noise, and flash of the coupling base. Booby trap firing devices were designed to be functioned by a thin trip wire or release of pressure that would release a cocked spring loaded firing pin. These small, unsealed, metal parts have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Simulator, Explosive Booby-trap: Flash, M117; Illuminating, M118; Whistling, M119. The booby-trap simulators are designed to be used as safe booby traps during maneuvers and in troop training to teach the installation, detection and use of booby traps, and to instill caution in troops exposed to traps set by an enemy. They consist of a cylindrical outer tube (made of Kraft paper), and a flat metal nailing bracket extending from one end of the tube. Located within the outer tube are an initiating charge assembly and an inner tube containing a pyrotechnic charge. Running through the initiating assembly is a length of pull cord. One end of the cord is covered with a friction composition, the other end is coiled

and a strip of tape. The M117 simulator has a dimple in the mounting bracket for additional identification at night. Issued with each simulator is a spool of trip wire, an extension spring, three staples, and four nails for booby trap installation. They are nailed against trees with a trip wire attached to the pull cord. It is functioned when a soldier applies pressure to the trip wire, pulling the cord through the ignition composition assembly, which produces a flash. The flash is transmitted through a flash tube, which ignites the pyrotechnic charge (*Army, 1994c*). It is unlikely that a paper-bodied simulator would survive years of exposure in the field. In the unlikely event that an unfired simulator was discovered and functioned, the type of injuries that would be sustained would be burns and lacerations to the hand from the exploding pyrotechnic charge, if it was being held when it functioned.

Summary: It is unlikely that a person could cause a booby trap simulator to function through casual contact if one were found at the site and be burned or lacerated, because it was made from paper that would have been exposed to moisture, degradation, and weathering for many years, which could decrease its effectiveness.

3.6.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Site OE-6 were reviewed and evaluated according to procedures described in the *Final Plan for Evaluation of Previous Work* (*HLA, 2000b*). The evaluation process is documented through the completion of a series of checklists. Copies of the checklist are provided as Attachment 6- A1. This section presents a summary of the results of the checklist evaluation. It is divided into two sections, an assessment of the literature review and an assessment of the sampling performed at the site.

3.6.6.1 Literature Review

Type of Training and OE Expected

According to the review of Fort Ord facilities and training maps, Site OE-6 appears on the circa 1954 map labeled as "Mines and Booby Traps." Because the site is identified as "Mines and Booby Traps," it is possible that mines, fuzes, firing devices, coupling bases, and booby trap simulators may be present at the site. Booby trap simulators can contain pyrotechnic charges. The components of the smoke charges associated with the practice mines contain black powder and/or red phosphorous. The 1945 Training Facilities map identifies the site as a "Camouflage Area." Although there is no information concerning what activities were associated with camouflage training at Fort Ord in the 1940s, it is expected that training would have involved concealing equipment or personnel with natural or artificial materials. It is therefore unlikely that OE would have been used during camouflage training. There are no training areas identified in the site on training maps after 1954. A Flame Thrower Range is south of the site area as seen on the 1957 and 1958 maps. Site OE-1 contains a description of flame thrower training. There is no historical evidence indicating that the site was used as an impact area at any time.

Subsequent Use of the Area

The site remains undeveloped. The Patton Housing Area, located south of the site, was developed in 1962. No reports of ordnance finds in this area were found during the literature review.

Establishment of Site Boundaries

There is general evidence on the 1956 aerial photograph that the area was in use (based on the presence of roads). However, historical aerial photographs are not helpful in delineating site boundaries as there are no features such as roads or fences that identify it as a training area. The boundary of Site OE-6 was

shown on the circa 1954 map, but the current ASR site boundary is smaller and lies north of the area identified on the 1954 map. The reason for this discrepancy is not known as the method for determining the site boundary was not documented in the ASR report. USACE St. Louis personnel were interviewed about changes in OE site boundaries appearing on the various versions of the ASRs produced. This interview indicated that the site boundaries were modified using interview notes, field (site walk) notes, aerial photos, and verbal input from meeting attendees.

Summary of Literature Review Analysis

Based on the literature review, the area was used for mines and booby trap training in the 1950s. Comparison of a 1954 training map to the ASR boundary shows that the actual training area may be south of the current ASR boundary. Based on the fact that the area was designated as a Mines and Booby Trap training area on a circa 1954 map, there was sufficient evidence to warrant the sampling performed at the site.

3.6.6.2 Sampling Review

This section describes the items that were found at the site and how these items support historical information concerning past use of the site. Site boundaries are assessed in terms of the items found. There is also a discussion regarding sampling equipment, methods, and quality control measures used during prior OE sampling programs.

Sampling Results (Items Found)

As summarized in Section 3.6.4, the initial investigation of Site OE-6 was completed in 1994 by HFA (*HFA, 1994*). Eight 100- by 100-foot grids were 100 percent sampled (all identified anomalies were excavated). One live small arms cartridge (it is unknown whether it was a bullet or blank shell) and one inert antitank practice M1 mine were found and removed during grid sampling. In the area between OE-1 and OE-6, five inert practice mines were found. As indicated in Attachment 6-A2, these OE items were produced prior to or during the time period (1950s) that the site was used for training. This supports that these items were present at the site as a result of past training practices. The HFA report did not document the grid location or the depths at which these OE items were found. Accordingly, the locations of these found OE scrap are not shown on Plate 6-4 which shows the grid locations. Table 6-2 summarizes OE scrap found during HFA sampling operations.

Because only one small arms cartridge was found it is unlikely that the site was used for small arms training. During general training, the troops would have been equipped with their basic equipment, including weapons and ammunition. The cartridge may have been dropped by troops training in the area. There was no evidence found to suggest that the site was used as an impact area. No OE were identified during sampling activities

With the exception of the small arms cartridge, the OE scrap found (inert practice mines) are consistent with what would be expected based on past training practices at the site. Additional information concerning the types of OE found is provided in Attachment 6-A2.

Site Boundaries Review

CMS resurveyed the OE-6 grid and site boundaries for location using current GPS technology in April 1997. Survey data currently reflect that the sampling grids were placed within the site boundary (*USAEDH, 1997*). The initial HFA sampling occurred outside of the Mines and Booby Trap boundary as delineated on the circa 1954 map. Follow-up sampling between OE-1 and OE-6 (additional HFA grids)

was within the boundary as identified on the circa 1954 map. Because five inert practice mines were found in the area between OE-1 and OE-6, it appears that the site extends further south than the current ASR site boundary.

Equipment Review

The Schonstedt Models GA-52/C or GA-72/Cv magnetometers were used by HFA in the 1994 survey and sampling effort. The HFA report does not specify which model was used at the site. The Schonstedt instruments are passive dual flux-gate magnetometers that are highly sensitive magnetic locators that detect ferrous (iron) metal objects; however, they cannot detect non-ferrous metal objects (e.g., lead, brass, copper, and aluminum). Magnetometers make passive measurements of the earth's natural magnetic field; ferrous metal objects and rocks are detected because they produce localized distortions (anomalies) in the magnetic field. The Schonstedt magnetometers actually detect slight differences in the magnetic field (the "gradient") by means of two sensors mounted a fixed distance apart within the instruments' staff. Because the magnetic response falls off (changes) greatly even over a short distance, a gradient magnetometer like the Schonstedt GA-52/Cx is especially sensitive to smaller, near-surface ferro-metal objects *(Breiner, 1973)*.

The performance of the Schonstedt GA-52/C and GA–72/Cv magnetometers was evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; *Parsons 2001*). Studies were performed as part of ODDS to evaluate:

- Signatures of inert OE items suspended in air at varying orientations and distances from the geophysical sensor (static tests).

- The ability of various geophysical instruments to detect and discriminate between different OE items buried at various depths (seeded tests).

- Geophysical instrument performance at actual OE sites (field trial site testing).

The Schonstedt tools were not evaluated during the static tests; therefore, only the seeded test results and the field trial tests are discussed herein. It is recognized that the ODDS study areas may not represent the same field conditions as Site OE-6; therefore, differences in field conditions, if applicable, should be considered when using information from the ODDS.

For the purposes of evaluating the geophysical instruments used at this site, it is assumed that practice mines, potentially discarded or left at Site OE-6, would be located at the surface or potentially buried at depths of up to 2 feet below ground surface. Mines were not specifically evaluated as part of the ODDS. However, other non-penetrating items (signal flares and hand grenades [ODDS Type I]) were evaluated as were penetrating items (2.36-inch and 3.5-inch rockets, rifle grenades, and 14.5 mm projectiles [ODDS Type II]). Therefore, the Type I and II seeded test results were used for comparison purposes in evaluating the performance of the geophysical equipment used at this site.

During the seeded tests, the Schonstedt Model GA-52/C located between 56 (search radius of 1.6 foot and lane width of 5 feet) and 59 (search radius of 3.3 feet and lane width of 5 feet) percent of the Type I items buried at depths ranging from just below the ground surface to 1 foot bgs and the Schonstedt Model GA-72/Cv located between 63 (search radius of 1.6 foot and lane width of 5 feet) and 78 (search radius of 3.3 feet and lane width of 5 feet) percent of the Type I items. The detection rate for Type II items for the Schonstedt Model GA-52/C ranged from 44 (search radius of 1.6 foot and lane width of 5 feet) to 49 (search radius of 3.3 feet and lane width of 5 feet) percent and the detection rate for Type II items for the

Schonstedt Model GA-72/Cv ranged from 41 (search radius of 1.6 foot and lane width of 5 feet) to 51 (search radius of 3.3 feet and lane width of 5 feet) percent.

Although not evaluated in the ODDS, practice mines that may contain energetic material generally contain a larger amount of ferrous material than the Type II items evaluated in the ODDS. This should result in a detection rate that would equal or exceed the detection rate for the Type II items. The detection rate percentages presented in the ODDS varied according to the search radius, which ranged from 1.6 to 3.3 feet and the search lane width which was 3 to 5 feet wide. A 5-foot wide search lane was used during the OE sampling programs at the site. Results for the 3-foot wide search lanes were not included in the detection percentages presented above because 3-foot search lanes were not used during the site investigations. A standard search radius for investigation anomalies was not specified in work plans or reports, therefore, the detection range for the different search radii are presented above. The anomalies were excavated until a metal object was found.

The seeded test detection rates are considered conservative because 1 foot was added to the item's calculated penetration depth to allow for soil deposition over time. Because the field conditions at the seeded test site and orientation of the subsurface item may not be comparable to Site OE-6 conditions, the results should only be used as an indication that the equipment is capable of detecting the same types of items at depths that are the same as used in the seeded tests.

Results of the ODDS Field Trial Sites (FTS) were also reviewed for potential use in evaluating instrument performance at the site. Detection rates were calculated for four of the six test sites; the remaining sites did not have enough OE detected to allow calculation of site statistics. The calculated detection rates for the combined sites ranged from 52 to 96 percent for the Schonstedt Model GA-52/C and 64 to 98 percent for the Schonstedt Model GA-72/Cv, depending on the search radius used for the calculation. As previously discussed, results for the 3-foot wide search lanes were not included in the detection percentages presented above because 3-foot search lanes were not used during the site investigations. The lower detection rates were for a 1.6-foot search radius and the higher detection rates were for a 3.3-foot search radius. It should be noted that the ODDS field trial sites were selected to represent areas with high OE density. In comparison, Track 1 sites, such as OE-6, are expected to have very low densities of OE scrap. Therefore, the field trial results may not be applicable to OE-6.

Results of the ODDS field trials for the field test site (FTS-3) that was closest in OE item density to OE-6 were also reviewed. Five OE items were located at FTS-3 and no additional items were found during sifting of 10 percent of each grid (final quality control sampling). This indicates that it is unlikely that OE items would remain at FTS-3 within the grids sampled. Similar results could be expected at other sites such as OE-6, after grid sampling using the Schonstedt magnetometers.

Although not directly comparable to Site OE-6, the results of the ODDS indicate that with the exception of plastic training mines, the Schonstedt Models GA-52/C and –72/Cv are capable of detecting the ferrous surface and subsurface OE expected at this site. It should be noted that Schonstedt tools are not capable of detecting brass small arms cartridges.

Sampling Methods Discussion

Sampling procedures were not described in the 1994 report documenting the OE sampling nor were sampling records provided. The following sampling procedures are those that were provided in the work plan (*HFA, 1993*).

According to the work plan, the center of the site and the outer boundaries of the site were to be located and marked. Eight survey grids were located and marked within the original site boundaries. An additional eight grids were also marked in the area south of the original Site OE-6 boundaries (MPUSD

area). According to the work plan, the grid dimensions were to be 100 by 100 feet and were to be separated by at least 200 feet. Each grid was to be given a 100 percent visual surface and subsurface survey using a Schonstedt Model GA-52/C magnetometer along a maximum 5-foot wide search lane. Surface items were to be marked and then removed. Subsurface contacts (anomalies) were marked with yellow flags for excavation and identification. Subsurface contacts were uncovered using hand tools (*HFA, 1993* and *1994*). Every identified anomaly was investigated (100 percent sampled). The general approach to investigation of the anomalies was to dig down to metal, remove the metal, and check the excavated area with the Schonstedt. If the Schonstedt indicated that there was no buried ferrous material, no further digging was performed. If the Schonstedt continued to indicate buried ferrous items, the area was excavated to at least 4 feet bgs. As noted above, one live small arms cartridge and six practice mines were found at the site and south of the site. The depths at which these items were found were not documented in the HFA report. Schonstedt tools are not capable of detecting brass small arms cartridges; therefore, it is likely that the cartridge was visually identified by field personnel.

Quality Assurance/Quality Control

The QA/QC procedures used during sampling are described below.

Field Sampling QA/QC

Specific information concerning operational procedures was not documented in the HFA report. The following describes field procedures specified in the work plan. According to the HFA work plan, equipment was to be inspected by the Senior UXO Supervisor (SUXOS) and Quality Control/Site Safety Officer (QC/SS) prior to placing it in service. Magnetometers were to be inspected and tested daily on a buried piece of ordnance (test source) to ensure that the magnetometers were operating within specification. The buried test source (inert ordnance item) was to be magnetically similar to a 2.36-inch rocket and buried at a depth of 3 feet, which was shallower than the maximum depth of clearance (4 feet) for their work order. Information in the final HFA report indicated that a solid steel 81mm mortar, buried at 4 feet bgs was used as the test source. The magnetometers were to be tested before starting OE operations in the morning and when operations resumed after lunch. Magnetometers that failed the inspection and test were determined to be in need of repair and were to be removed immediately from service. Random checks were to be performed by the QC/SS and/or the SUXOS during daily operations. The QC/SS was to inspect all records bi-weekly to ensure that they were kept and maintained. After surface and subsurface clearance of each site and prior to removal of grid markers, the QC/SS was to perform the standard minimum 10 percent QC check. If OE was detected during the QC check, the grid was searched again to ensure that there were no other OE present. No QA records for this sampling effort are available. All grids were to be left in place until the CEHND Safety Specialist completed his Quality Assurance (QA). QC reports that included descriptions and results of the QC checks were to be completed daily.

QA/QC performed throughout the field sampling is documented in the final report (*HFA, 1994*). According to the report, the project was completed without QC discrepancy. It was not possible to perform a check of the reported results and field grid sampling documentation because they were not available.

Data Management QA/QC

Parsons, the current OE contractor, performed a 100 percent QC review of the data associated with the site. This review followed guidelines presented in the Standard Operating Procedures provided as Appendix A of this document. This evaluation included a review of field grid records (if available) and the database created by the OE contractor. The USACE followed the QC review with a 10 percent QA of

the Parsons' data review. The requirements of the QA review are described in the SOP provided as Appendix B of this report. The purpose of the data review was to complete a 100 percent check of all available grid records to identify discrepancies between the reports documenting field activities and the grid records. Discrepancies were then researched and corrections made, if appropriate, prior to loading the data into the project database.

3.6.6.3 Site Walk Review

This section describes the items that were found during the site walk investigation and the implications for the site history. One site walk has been conducted at Site OE-6. The site walk, conducted in June 2004, involved a three-person team that included a UXO Safety Specialist. The investigation involved the team walking a portion of the site, surveying the path walked using a Schonstedt Model GA-52/Cx magnetometer. The Schonstedt was used to detect subsurface anomalies that might indicate that further investigation was warranted. The team also carried a GPS to record the site walk path and the locations of any anomalies identified with the Schondtedt. Only OE scrap items (two expended fuzes for M1 series practice mines and one expended firing device[M1]) were found during the site walk; live and expended small arms ammunition were also found. The OE scrap items found during the site walk are consistent with both the type of OE scrap items found in this area during previous sampling events and with the type of OE scrap items expected in a practice mine and booby-trap training area. A summary of the results of the site walk is included as an attachment to Appendix C of this report.

Data Quality Conclusions

For this site the following conclusions can be made regarding the quality of the data:

- Data collected by HFA were within the ASR site boundaries for OE-6 and some of the MPUSDA grids fell within the area that was identified on the 1954 Training map as the Mines and Booby Trap training area
- The data collected by HFA were useful in providing information concerning the type of OE scrap present at the site
- Coordinate data were not collected by HFA for locations of found items
- Information concerning depth of found items was not collected by HFA
- The instruments used for OE sampling cannot be used to find non-metallic practice mines.

3.6.7 Conclusions and Recommendations

This section presents conclusions and recommendations for Site OE-6 that are based on review of historical information and sampling data collected from the site.

3.6.7.1 Conclusions

Site Use and Development

- Based on the literature review and site sampling results, the site appears to have been used for mine and booby trap training. The site is currently unoccupied but is adjacent to residential housing.

- The following OE items, if present at the site, are considered to pose an acceptable risk if encountered for the following reasons:

Antipersonnel Practice Mines (M8, M8A1) and Fuzes (M10, M10A1). It is unlikely that a person would be able to trigger the practice antipersonnel mine through casual contact if one were found at the site and be burned or exposed to smoke or falling parts, because the mine: (1) would have to contain a live fuze, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Antitank Practice Mines (M12, M12A1, M20) and Fuzes (M604). It is highly unlikely that a person would be able to trigger a fuze through casual contact if one were found at the site and sustain a burn injury, because the fuze: (1) was designed to be triggered by the weight of a vehicle, and (2) would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function.

Antitank Practice Mines (M1, M1A1) and Fuzes (M1A1, M1A2). It is highly unlikely that a person would be able to trigger a practice antitank mine through casual contact if one were found at the site and be exposed to smoke and noise, because the mine: (1) would have to contain a live fuze and active detonator, (2) was designed to be triggered by the weight of a vehicle, and (3) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Booby Trap Firing Devices. It is unlikely that a person through casual contact could cause an armed booby trap firing device fitted with a coupling base to function if one were found at the site, and be exposed to the shock, noise, and flash of the coupling base. Booby trap firing devices were designed to be functioned by a thin trip wire or release of pressure that would release a cocked spring loaded firing pin. These small, unsealed metal parts have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Simulator, Explosive Booby-trap: Flash, M117; Illuminating, M118; Whistling, M119. It is unlikely that a person could cause a booby trap simulator to function through casual contact if one were found at the site and be burned or lacerated, because it was made from paper that would have been exposed to moisture, degradation, and weathering for many years, which could decrease its effectiveness.

- Based on the literature review and the presence of practice mines south of the ASR site boundary, it appears that the ASR site boundary does not include the entire area that was formerly used for mines and booby trap training.

Sampling Adequacy and Data Quality

- Schonstedt GA-52/C and GA-72/Cv magnetometers were used by HFA during previous investigations. These instruments were evaluated as part of the ODDS and with the exception of non-metallic mines and small arms ammunition, these instruments are capable of detecting the type of OE items expected at this site

- Survey data currently reflect that at least four of the grids were placed within the established site boundaries for Site OE-6. Because five inert practice mines were found in the area between Sites OE-1 and OE-6, it appears that the site extends further south than the ASR site boundaries.

- The area identified on the 1954 Training map as the Mines and Booby Trap training area is south of the ASR site boundary. At the direction of the CEHND Safety Specialist, this area (designated as the MPUSDA) was also sampled by HFA.

- Data collected by HFA were within the ASR site boundaries for OE-6 and some of the MPUSDA grids fell within the area identified on the 1954 Training map as the Mine and Booby Trap training area.

- The sampling data was useful in providing information concerning the type of OE scrap present at the site. However, coordinate and depth data were not collected for the locations of found OE scrap, and the instruments used for OE sampling cannot be used to find non-metallic practice mines.

- Although the previous OE sampling efforts performed at Site OE-6 are not consistent with requirements in place today, the quantity and quality of available information is sufficient to make an informed decision regarding the site. The entire site was not sampled, however, the sampling methods were sufficient to confirm the types of OE items used at the site. Additionally, because the OE items used at OE-6 are considered to pose an acceptable risk (see Section 3.6.5.4), and only OE scrap (e.g., no live OE) was found in previous investigations at OE-6, additional OE sampling at the site would not add significantly to the understanding of the site or change the conclusions of this report.

- The data collected and observations made during the site walk at Site OE-6 are useful because only expended practice mine fuzes and an expended firing device (OE scrap) and small arms ammunition were found, further supporting the conclusion that Site OE-6 was used for practice mine and booby-trap training and no further OE-related investigation is necessary.

3.6.7.2 Recommendations

Based on the review of existing data:

- It is recommended that the site boundary be expanded to the south to include the area identified as "Mine and Booby Trap Area" on the circa 1954 training map.

- It is not anticipated that OE will be found at Site OE-6. However, there is potential for OE to be present at the site because OE were used throughout the history of Fort Ord.

- This site qualifies as a Track 1, Category 3 site because it was used for training. OE items that potentially remain, pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

- No further OE-related investigation is recommended.

These conclusions and recommendations are based on the following:

- The literature review and sampling provide no evidence that high explosives were used at the site or that the site was used as an impact area

- No live OE was found during the OE sampling programs. OE-scrap items found were those used for training purposes only.

The U.S. Army Corps of Engineers completed ordnance investigations at Site OE-6. The Army, with regulatory oversight from the U.S. Environmental Protection Agency (USEPA) and the California Department of Toxic Substance Control (DTSC), conducted a systematic investigation and no explosive

material was found. The investigation was specifically designed to assess the nature of the past military training activities at the site. Even though no actionable risk was identified through the remedial investigation process, in the interest of safety the Army recommends reasonable and prudent precautions be taken when conducting intrusive operations at the site. Construction personnel involved in intrusive operations at the site should attend the Army's "ordnance recognition and safety training" to increase their awareness of and ability to identify OE items. Trained construction personnel will contact an appropriate local law enforcement agency if a potential OE item is encountered. The local law enforcement agency will arrange a response by the Army. To accomplish that objective, the Army will request notice from the landowner of planned intrusive activities, and in turn will provide ordnance recognition and safety training to workers prior to the start of intrusive work. Additionally, while these intrusive activities are ongoing, the Army will conduct weekly site visits and provide refresher education as appropriate.

Upon approval of the proposed remedy (no further OE-related investigation), Site OE-6 will be incorporated into the basewide OE RI/FS 5-year review schedule. The purpose of the 5-year review is to determine whether the remedy at Site OE-6 continues to be protective of human health and the environment. The 5-year review will also document any newly identified site-related data or issues identified during the review, and will identify recommendations to address them as appropriate. At the time of the next 5-year review, the Army will assess whether the education program should continue. If experience indicates that no explosive items have been found in the course of development or redevelopment of the site, it is anticipated that the education program may, in consultation with the regulatory agencies, be discontinued, subject to reinstatement if an explosive item is encountered in the future

3.6.8 References

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TABLES

Table 6-1. Sampling Operations
Site OE-6 and MPUSD Area
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	Operation Type	Contractor	Instrument	Grid Completion Date
OE-06 -- Booby Traps and Land Mines	D2J4E7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4F6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4F6-02	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4F7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4F7-02	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4G7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
OE-06 -- Booby Traps and Land Mines	D2J4H7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D2J4B4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D215J4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D214H4−01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D214G0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D215G4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D215D4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D214F8−01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	D214A8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not available

Table 6-1. Sampling Operations
Site OE-6 and MPUSD Area
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	Operation Type	Contractor	Instrument	Grid Completion Date

Site = OE Site Number
Sampling = 100 percent of the anomalies detected were excavated to a minimum depth of 4 feet. Deeper anomalies were investigated if directed by the USACE.
HFA = Human Factors Applications, Inc.

Note: Fields with annotation of "not available" is a void field in the OE database.

Table 6-2. OE Scrap Found During Sampling Operations
Site OE-6 and MPUSD Area
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	OE Items	Status	Depth (in)	Quantity
OE-06 -- Booby Traps and Land Mines	OE-06	Mine, antitank, practice, M1	Inert	Not available	1
OE-06 -- Booby Traps and Land Mines	OE-06	Mine, antitank, practice, M1	Inert	Not available	1
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	MPUSD	Mine, antipersonnel, practice, M8 series	Inert	Not available	1
MPUSD -- Monterey Peninsula Unified School District Area (MPUSD)	MPUSD	Mine, antitank, training, M80	Inert	Not available	4

Site = OE Site Number
Grid = Grid in which item was found.
Status = Condition of item, either live or inert. Inert indicates no OE hazard.
Depth = inches below ground surface that item was found.
Quantity = Number of like items found.

Note: Fields with annotation of "not available" is a void field in the OE database.

PLATES

Disclaimer

The following plates have been prepared to present pertinent features digitized from historical training maps and scanned aerial photographs. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time may contribute to misalignments of some map features with respect to the aerial photographs.

ATTACHMENT 6-A1

EVALUATION CHECKLISTS

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

	Yes	No	Inconclusive

TYPE OF TRAINING AND OE EXPECTED

1. ***Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades or other launched ordnance)?***		No	

Sources reviewed and comments
There is no evidence to indicate that the site was used as an impact area. Training maps indicate that the site vicinity was used as a camouflage area in 1945 and for mines and booby trap training circa 1954. During sampling, no evidence of fired OE was found.
References:
HFA, 1994; Army 1945, 1954.

2. ***Is there historical evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?***	Yes		

Sources reviewed and comments
The components of the smoke charges and/or fuzes associated with the practice mines and booby traps could be HE or LE. Site was used for mines and booby trap training and as a camouflage area.
References:
USAEDH, 1997.

3. ***Is there historical evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?***	Yes		

Sources reviewed and comments
Booby trap simulators can contain pyrotechnic charges.
References:
HFA, 1994; Army 1977.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

	Yes	No	Inconclusive
DEVELOPMENT AND USE OF THE SURROUNDING AREA			
4. *Does subsequent development or use of the area indicate that OE would have been used at the site?*		No	

Sources reviewed and comments
There is no evidence to indicate OE use. Housing was built adjacent to training area beginning in 1962.
References:
USAEDH, 1997; HFA, 1994; Army 1945, 1954.

	Yes	No	Inconclusive
5. *Does use of area surrounding the site indicate that OE would have been used at the site?*	Yes		

Sources reviewed and comments
The current site boundary is within 200 feet of the boundary of the City of Marina (farmland/residential) and 200 feet east of Highway 1. The City of Marina and Hwy 1 were present prior use of the OE-6 as a training area. Three former practice mortar squares and a flame thrower range were approximately 1000 feet south of the current Site OE-6 boundary and as close as 300 feet to the digitized boundary of the mines and booby trap area taken from a circa 1954 map. Information gathered to date indicates that the practice mortar squares were used for practice purposes only and would not have generated OE. It is possible that flame thrower ignition cartridges (pyrotechnics) were used at the flame thrower range. Housing (Patton Park) was constructed adjacent to the site beginning in 1962.
References:
Topographic Map, Camp Ord and Vicinity 1933-34; Aerial photos, 5/14/1956; Circa 1954 map.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

	Yes	No	Inconclusive
ESTABLISHMENT OF SITE BOUNDARIES			
6. ***Is there evidence of training areas on aerial photographs that could be used to establish***		No	

Sources reviewed and comments
There is general evidence that the area was in use (development of roads). However, aerial photographs are not helpful in delineating site boundaries.
References:
Aerial photographs dated 8/17/1949; 7/3/1951; 5/14/1956; and 5/2/1966.

7. ***Is there evidence of training on historical training maps that could be used to establish boundaries?***	Yes		

Sources reviewed and comments
Boundaries of Site OE-6 are identified on the circa 1954 map.
References:
Army, 1954.

8. ***Should current boundaries be revised?***	Yes		

Sources reviewed and comments
The current site boundary appears to be too small and too far to the north of the area delineated on the circa 1954 map. The area to the south has been sampled and only OE scrap was found.
References:
Army, 1954.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 1: LITERATURE REVIEW

RESULTS OF LITERATURE EVALUATION

	Yes	No	Inconclusive
Does the literature review provide sufficient evidence to warrant further investigation?	Yes		

Comments
Based on area designated as "Mines and Booby Traps" on the circa 1954 map, there was sufficient evidence to warrant the sampling performed.
References:
USAEDH, 1993, 1997; Army 1954.

References
Army, 1945. Training Facilities, Fort Ord and Vicinity, California. Revised August 1945.
Army 1954. Training Areas That Cannot Be Used at the Same Time, Circa 1954.
Army, 1977. Technical Manual, Army Equipment Data Sheets for Land Mines. TM 43-001-36. February.
HFA, 1994. Volume I OE Sampling and OEW Removal Action, Fort Ord Final Report, Fort Ord, California. December 1.
USAEDH, 1993. Archives Search Report, Fort Ord, California, Monterey County, California. Prepared by U.S. Army Corps of Engineers, St. Louis District. December.
USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
1. ***Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades and other launched ordnance)?***		No	

Sources reviewed and comments
There is no evidence to suggest that the area was an impact area. No launched OE or OE scrap were identified during sampling activities.
References:

	Yes	No	Inconclusive
2. ***Is there evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?***	Yes		

Sources reviewed and comments

Inert or expended practice mines (OE scrap) have been found at the site. Practice mines can include smoke charges (LE).
References:
HFA, 1994.

	Yes	No	Inconclusive
3. ***Is there evidence that training involved use of pyrotechnic and/or smoke producing items (e.g., simulators, flares, smoke grenades) but not explosives?***	Yes		

Sources reviewed and comments
Booby trap simulators can contain a pyrotechnic charge.
References:
HFA, 1994; USAEDH, 1997; Army, 1977.

	Yes	No	Inconclusive
4. ***Was sampling and/or reconnaissance performed within the appropriate area?***			Inconclusive

Sources reviewed and comments
Initial sampling occurred outside of the boundary as delineated on the "circa 1954" map. Follow-up sampling (additional HFA grids) were within the boundary as identified on the "Circa 1954" map.
References:
HFA, 1994; Army 1954.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
5. ***Does sampling indicate OE and/or ordnance-related scrap are present at the site?***	Yes		

Sources reviewed and comments
cartridge were found during sampling within the site boundaries. Five inert or expended practice mines were found south of the site.
References:
HFA, 1994; USAEDH, 1997.

	Yes	No	Inconclusive
6. ***Were the type(s) of items found consistent with the type of training identified for the site?***	Yes		

Sources reviewed and comments

One expended practice mine (M1) was found within the site boundaries. Five inert practice mines were found south of the site. These items are consistent with use of the area as a mine and booby trap area. There was a small arms cartridge found. This indicates troop training. Generally for training troops are equipped with basic gear, including ammunition, which may have been dropped at the site.
References:
HFA, 1994; USAEDH, 1997; Sease, 2002.

	Yes	No	Inconclusive
7. ***Were the type(s) of items found consistent with the era(s) in which training was identified?***	Yes		

Sources reviewed and comments
M1 AT mines were used in WW II. OE-6 was used as a mine and booby trap training area in the mid to late 1950s.
References:
Hogg, 2000; Army, 1954.

	Yes	No	Inconclusive
8. ***Was HE fragmentation found?***		No	

Sources reviewed and comments
No HE fragmentation was found. Only one expended practice mine (M1) and one live small arms cartridge were found within site boundaries.
References:
HFA, 1994; USAEDH, 1997.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
9. *Was HE found?*		No	

Sources reviewed and comments
No HE was found. Only one expended practice mine (M1) and one live small arms cartridge were found within site
References:
HFA, 1994; USAEDH, 1997.

	Yes	No	Inconclusive
10. *Were LE found?*	Yes		

Sources reviewed and comments
One live small arms cartridge and only one expended practice mine (M1) were found within site boundaries.
References:
HFA, 1994a; USAEDH, 1997.

	Yes	No	Inconclusive
11. *Were pyrotechnics found?*		No	

Sources reviewed and comments
Only inert or expended practice mines (OE scrap) have been
References:
Army, 1977; HFA 1994.

	Yes	No	Inconclusive
12. *Were smoke producing items found?*		No	

Sources reviewed and comments
Only one expended practice mine (M1) and one live small arms cartridge.
References:
HFA, 1994a; USAEDH, 1997; Army, 1977.

	Yes	No	Inconclusive
13. *Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?*		No	

Sources reviewed and comments
No explosive items were found. Only inert or expended practice mines (M1) and one live small arms cartridge were found.
References:
HFA, 1994a; USAEDH, 1997.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
14. ***Do items found in the area indicate training would have included use of training items with energetic components?***	Yes		

Sources reviewed and comments
No energetic devices were found. However, firing devices, activators/detonators and smoke charges associated with the practice mines and booby traps may contain energetic components.
References:
HFA, 1994a; Army, 1977.

15. ***Were items found in a localized area (possibly the remnants of a cleanup action)?***			Inconclusive

Sources reviewed and comments
The specific location of where the inert or expended practice mines were found is unknown.
References:
HFA, 1994a.

16. ***Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/other unique site features?***		No	

Sources reviewed and comments
The site was not divided into sectors based on site usage or site features.
References:
HFA, 1994a.

17. ***Should current site boundaries be revised?***			Inconclusive

Sources reviewed and comments
Current site boundaries do not include the area identified as "Mines & Booby Traps" as delineated on the "circa 1954" map. However, this area identified as "Mines and Booby Traps" was sampled for OE by HFA in 1994.
References:
Army, 1954.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
18. ***Was equipment used capable of detecting items suspected at the site at the maximum expected depth?***	Yes		

Sources reviewed and comments
simulators would be expected at or near the ground surface. The site grids were sampled to a depth of 4 feet bgs. Schonstedt GA-52/C or GA-72/Cv magnetometers were used by HFA during previous investigations. Results of the ODDS study indicate that these instruments are capable of detecting the ferrous OE expected at this site. Schonstedt tools would not be able to detect plastic practice mines or brass small arms cartridges.
References:
HFA, 1994a; USA, 2000; USAESCH, 1997; Parsons, 2001.

19. ***Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?***		No	

Sources reviewed and comments
Equipment used was capable of detecting metallic objects. Many of the practice mines have steel bodies and the firing devices contain metallic parts, so these items are likely to have been detected. However, some inert practice mines are non-metallic.
References:
USAESCH, 1997; Parsons, 2001.

20. ***Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?***	Yes		

Sources reviewed and comments
devices were not listed as items of study in the ODDS but would probably be categorized as Type I or Type II. Schonstedt GA-52/C or GA-72/Cv magnetometers were used by HFA during previous investigations. Although not directly comparable to Site OE-6, the results of the ODDS indicate that these magnetometers are capable of detecting the ferrous OE expected at this site. It should be noted that plastic practice mines and brass small arms cartridges could not be detected by the equipment used because they are non-ferrous.
References:
HFA, 1994a; USA, 2000; Parsons, 2001.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
21. ***Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?***			Inconclusive

Sources reviewed and comments
Although not directly comparable to Site OE-6, results of the ODDS suggest that the equipment used should be able to detect ferrous OE to a depth of 2 feet bgs.
References:
HFA, 1994a; USA, 2000; Parsons, 2001.

22. ***Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?***	Yes		

Sources reviewed and comments
As stated in the After Action Report, "Each magnetometer was tested each morning and field tested after lunch to determine that it was operating correctly".
References:
After Action Report - HFA, 1994a.

23. ***Based on the anticipated target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?***			Inconclusive

Sources reviewed and comments
There is no anticipated density of items. The practice mines were probably inadvertently left at the site and generally were considered as "scrap".

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
24. ***Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a OE density estimate, and if so provide total area investigated and the OE density estimate.***			Inconclusive

Sources reviewed and comments
Based on a map in HFA, 1994a, it appears that 8 grids were sampled. This represents an area of 80,000 square feet or 1.84 acres (based on 100x100-foot grids). One practice mine was found.
8 additional HFA grids were sampled between Site OE-1 and Site OE-6 boundaries. These grids were 100 x 100 feet. Therefore, an estimated 80,000 square feet or 1.84 acres were sampled. Four inert or expended anti-tank land mines and one expended antipersonnel mine were found during this sampling effort. No OE was found; therefore OE densities were not calculated.
References:
HFA, 1994b and 1994a.

Total Area: 160,000 sq. ft		
OE Density:	Not calculated	

25. ***What percentage of the anomalies were intrusively investigated?***

Sources reviewed and comments
HFA sampling consisted of 100% sampling. (The number of anomalies identified is unknown)
References:
HFA, 1993 and 1994a.

Total % of anomalies investigated:	100%

26. ***Was the appropriate data processing scheme used for the site, how was the data processed?***		Not Applicable

Sources reviewed and comments
All data collected using the Schonstedt, no data processing required.
References:
HFA, 1994a.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
27. ***Has the field data been collected and managed in accordance with quality control standards established for the project?***			Inconclusive

Sources reviewed and comments
"The project was completed without QC discrepancy," (After Action Report - HFA, 1994a). HFA field data are not available for review. It is not possible to perform a 10% check of reported results and field/grid records.
References:
HFA, 1994a.

Result of Sampling Evaluation

Does the sampling evaluation provide sufficient evidence to warrant further investigation?		No	

Comments
It appears that the sampling was performed within the digitized boundaries of the site. This information combined with the expanded sampling between Sites OE-1 and OE-6 provides sufficient information regarding the type, presence, and density of OE items in the site vicinity.

References
Army 1954. Training Areas That Cannot Be Used at the Same Time, Circa 1954.
Technical Manual, Army Ammunition Data Sheets for Land Mines (FSC 1345), TM 43-0001-36. February 14. HLA# 62040
Human Factors Applications, Inc., (HFA) 1994a. Explosive Ordnance Disposal Division, OEW Sampling And OEW Removal Action, FT. ORD FINAL REPORT. December 1.
HFA, 1994b. Human Factors Applications, Inc. Explosive Ordnance Disposal Division, OEW Site Operations Fort Ord-Phase III Work Plan and Site Specific safety and Health Plan. February 22.
Hogg, Ian V., 2001. The American Arsenal. Greenhill Books. London.
Parsons, 2001. Draft Ordnance Detection and Discrimination Study (ODDS), Former Fort Ord, Monterey, California. August.

ATTACHMENT 6-A1
EVALUATION OF PREVIOUS WORK: SITE OE-6
EVALUATION CHECKLIST PART 2: SAMPLING EVALUATION

	Yes	No	Inconclusive
USA Environmental, Inc., (USA) 2000. Ordnance Detection And Discrimination Study, Seeded Test Technical Memorandum, Former Fort Ord, California, Presidio of Monterey, California. In Cooperation with US Army Corps of Engineers Sacramento District and Parsons Engineering Science, Inc. October 23. Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District. HLA#33006 USAEDH, 1998. Engineering Evaluation/Cost Analysis – Phase 2 Former Fort Ord Monterey County, California. Appendix F. April.			

ATTACHMENT 6-A2

POTENTIAL ORDNANCE USED AT SITE OE-6

ATTACHMENT 6-A2

POTENTIAL ORDNANCE USED AT SITE OE-6

Mines

Information concerning mines and fuzes potentially used at the site was obtained from technical manuals (*Army, 1977a, b*) and *The American Arsenal* (*Hogg, 2001*). Practice, inert, and training mines potentially used at the site could include of the following:

M1 antitank practice mine – M1 antitank practice mines were used in World War II. According to Headquarters Munitions Command data cards, these mines were produced between 1941 and 1945. The M1 consists of a mine body, spider, black powder charge, smoke charge, detonator, firing pin assembly, safety fork, fuze, shear pins, and steel filler ring. The steel filler ring is inserted in the mine body so that the M1 will equal the weight of the M1A1 and M4 mines. The fuze consists of a striker assembly and a body that contains the detonator. In the M1, the fuze sets off a smoke–puff charge; the charge produces smoke which escapes from the mine through the holes. The charge consists of 60 grains of army black powder, which ignites 100 grains of red phosphorous. The complete assembly weighs 10.67 pounds and is 8.2 inches in diameter and 4.25 inches high (*Hogg, 2001*).

M10 Antitank practice light mine – The M10 antitank practice mine consists of a rectangular steel container that is loaded with sand in the field. According to Headquarters Munitions Command data cards, the M10 antitank practice mine was produced between 1946 and 1947. A primary fuze well for the practice fuze is located in the top center of the mine. The smoke charge is contained in the fuze. The M10 practice mine can be booby trapped with a regular firing device threaded directly into the secondary fuze well. Functioning of the fuze ignites a smoke charge that emits a cloud of smoke and creates a noise. When booby trapped, the mine is activated by a pull wire (*Army, 1977a, b*).

M8 (M8A1) Antipersonnel practice mine – According to Headquarters Munitions Command data cards, the M8 antipersonnel practice mines were produced between 1944 and 1960. The M8 mine uses a cardboard projectile containing a delay and a spotting charge of black powder, which bursts in the air. The M8A1 uses a smoke pellet that is discharged from the top of the main body of the mine to indicate activation of the mine. The fuze firing mechanism on both models is activated by an applied load of 8 to 20 pounds on any of the prongs or by a pull of 3 to 10 pounds of the trip wire. In the M8, the fuze firing train ignites the delay element in the projectile and propels it about 2 meters into the air. The delay initiates the spotting charge that explodes with a loud report and emits smoke. In the M8A1 the fuze firing train ignites the yellow smoke pellet through a 4 to 5 second delay. The plastic plug is propelled into the air allowing the yellow smoke to be emitted from the top of the mine.

The M604 fuze is used to activate the M12, M12A1, and M20 anti tank practice mines. According to Headquarters Munitions Command data cards, these fuzes were produced between 1953 and 1954. The fuze is an instantaneous, mechanical pressure-actuated type. It consists of a steel body containing a firing pin assembly, cover assembly, primer and smoke charge, and safety fork. It is attached to the mine in the field, and after it is fired, it can be replaced. The primer ignites the smoke composition that flashes, emitting a cloud of smoke and creating a noise. The M45 primer consists of 1.62 grams of PA #100 and 2.96 grams of black powder (*Army, 1977a).*

Booby Traps - Firing Devices and Simulators

The following information was obtained from Department of the Army Field Manual FM 5-31, Booby Traps, dated September 1965 and represent the types of firing devices that may have been used at Fort Ord in the 1950s when the area was used for mine and booby Trap training. Information for the booby trap simulators was obtained from *Technical Manual, Army Ammunition Data Sheets: Military Pyrotechnics (Federal Supply Class 1370), TM 43-0001-37*

M5 Pressure Release Firing Device – The M5 Firing device consists of a protective cap, standard base, cap, gasket, activator, locking safety pin, interceptor pin, firing pin, release plate or pressure base. The M5 is activated by release of pressure. Lifting or removing a restraining weight releases the striker or firing pin to fire the cap.

M1A1 Pressure Firing Device – The internal action of the M1A1 pressure firing device is a spring-driven striker with a keyhole slot release. It contains a safety clip and positive safety pin. 20 pounds of pressure on the pressure cap moves the trigger pin downward until the striker spindle passes through the keyhole slot. This releases the striker to fire the percussion cap.

M1 Pull Firing Device – The internal action of the M1 pull firing device is mechanical with a split head striker release. It has a locking and positive safety pins. It is initiated by a 3 to 5 pound pull on a trip wire which withdraws the tapered end of the release pin from the split head of the striker. This frees the striker to fire the percussion cap.

M3 Pull/Release Firing Device – The internal action of the M3 pull/release firing device is mechanical with spreading striker head release. A pull of 6 to 10 pounds on a taut trip wire raises the release pin until the shoulder passes the constriction in the barrel of the device. The striker jaws then spring open, releasing the striker to fire a percussion cap. The device can also be actuated by a release of tension (cutting a taut trip wire) permitting the spring driven striker to move forward firing the percussion cap.

M1 Pressure Release Firing Device – The internal action of this firing device is mechanical with a springed latch release. It has a safety pin and hole for interceptor pin. Lifting or removing a restraining weight unlatches a lever, releasing the striker to fire a percussion cap

M117 Flash, M118 Illuminating, and M119 Whistling Explosive Booby Trap Simulators – Explosive booby trap simulators are used during maneuvers and during training exercises to teach the installation, detection, and use of booby traps. According to Headquarters Munitions Command data cards, these booby trap simulators were produced between 1951 and 2000. The simulators consist of a cylindrical outer tube and a flat metal nailing bracket extending from the end of the tube. Within the outer tube there is a charge initiating assembly and an inner tube containing a pyrotechnic charge. Running through the initiating assembly is a pull cord. One end of the cord is covered with a friction composition. The other end is coiled and secured in the end of the body by a paper cap and tape. A spool of trip wire, extension spring, three staples, and four nails are provided for booby trap installation. Movement of the pull cord produces an ignition flash that is transmitted into the flash tube, igniting the pyrotechnic charge. The M117 produces an instantaneous explosion, flash and, sound on initiation. The M118 produces a 28-second illumination flame, and the M119 produces a 2.5 to 5 second whistle (*Army, 1977b*).